

December 2, 2019

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**CLEAN GRID ALLIANCE'S COMMENTS REGARDING  
INDIANA MICHIGAN POWER COMPANY'S 2018 INTEGRATED RESOURCE PLAN**

Dear Messrs. Peabody and Borum:

Enclosed are Clean Grid Alliance's ("CGA") comments regarding Indiana Michigan Power Company's ("I&M") 2018 integrated resource plan filed on July 1, 2019 ("Plan"). CGA's comments address the following points: [1] I&M's ability to meet customer demand and encourage economic development by accelerating renewable development; [2] the importance of third-party data to confirm the cost-effectiveness of renewable generation; [3] the benefits of an "All Source Request for Proposals" on an annual basis; [4] the benefits of I&M's plan to procure a balanced mix of renewable generation; [5] the importance of a well-designed green tariff program; [6]; the reasonableness of I&M's resource planning models; [7] to reasonably account for higher penetrations of renewable resources through hourly and sub-hourly system modeling; [8] to I&M's commitment to battery storage; and [9] the need for transmission planning to deliver electricity from its forecasted generation to its customers at the lowest overall production cost of electricity.

Respectfully submitted,

/s/

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Brian Rybarik  
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Clean Grid Alliance

## COMMENTS

CGA believes that I&M's plan presents a reasonable step forward in updating the utility's resource mix for the future. I&M has signaled its intent to transition away from fossil generation and develop renewable generation in the near-term. I&M's preferred plan results in the potential addition of up to 1,700 megawatts ("MW") of solar generation and 1,950 MW of wind generation.<sup>1</sup> However, in the out years of the Plan, I&M plans to invest significantly in gas generation to meet expected capacity shortfalls.<sup>2</sup> While I&M identifies that the Plan is flexible (particularly in the out years), CGA believes that a greater commitment to renewable generation is cost-effective for customers, provides economic development opportunities for the utility and the state of Indiana, and will provide a cleaner future. With this outcome in mind, CGA submits the following comments and recommendations for the Commission's and I&M's consideration.

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<sup>1</sup> Plan at Table ES-2.

<sup>2</sup> *Id.* (identifying new gas plants in 2034 and 2037 for a total of 2,695 MW).

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**1. I&M SHOULD ADVANCE RENEWABLE DEVELOPMENT TO ACCOUNT FOR CUSTOMER DEMAND FOR RENEWABLE GENERATION**

First, CGA commends I&M for taking a proactive approach to its changing generation fleet. Despite I&M’s understanding that legislation or regulations on CO<sub>2</sub> emissions are unlikely in the near-term<sup>3</sup>, I&M nonetheless understands the need to transition to a future away from fossil generation, and toward a more diverse portfolio of supply-side resources that includes wind, solar, and battery storage.<sup>4</sup> This is a critical recognition and will lead to some development of renewables and storage to serve I&M’s load in the near term.

CGA is encouraged by the fact that I&M is pursuing renewable additions early, and indeed throughout the Plan, as identified in the following Table:<sup>5</sup>

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<sup>3</sup> Plan at 79 (indicating that carbon legislation is unlikely in the 116<sup>th</sup> Congress).

<sup>4</sup> Plan at 130-131.

<sup>5</sup> Plan at 131, Table 27.

**Table 27. Cumulative Capacity Additions (MW) for Preferred Plan**

	Commodity Pricing	Resource	Year																					
			2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038		
Case 9 (Preferred)	BASE	New Solar Firm				76	153	153	229	305	381	458	559	661	737	814	865	865	865	865	865	865		
		New Solar				150	300	300	450	600	750	900	1100	1300	1450	1600	1700	1700	1700	1700	1700	1700	1700	
		New Wind Firm				37	55	55	55	55	55	74	92	92	111	129	148	166	185	203	221	240	240	
		New Wind				300	450	450	450	450	450	600	750	750	900	1050	1200	1350	1500	1650	1800	1950	1950	
		New DG Firm				10	12	15	16	17	17	19	20	22	24	25	28	30	31	33	35	36	36	
		New Microgrid (RICE)				18	18	18	36	36	36	54	54	54	54	54	54	54	54	54	54	54	54	
		New CT																						
		New DSM		19	36	50	62	71	81	89	97	105	96	102	101	101	101	100	102	97	61	86	86	
		New VVO																9	9	9	9	9	9	
		New Battery Storage				10	10	10	30	30	30	50	50	50	50	50	50	50	50	50	50	50	50	
		New CC										770	770	770	770	770	770	770	1540	1540	1540	2695	2695	
		New STMP						150	150					200	100									
		New DR																	14	29	43	58	72	86

CGA appreciates that I&M is building flexibility into the Plan to avoid fossil resources in the event that “long-term renewable cost assumptions change.”<sup>6</sup> CGA believes that long-term renewable costs will continue to decrease, making them a better option for customers. Given the cost-competitiveness that renewables already have, I&M should advance its renewable purchasing earlier in the Plan. Earlier integration of renewable generation may obviate the need to build more expensive gas generation in the later years of the Plan as coal and nuclear facilities retire.

More importantly, by advancing its renewable development, I&M can send a strong signal to the marketplace. Utilities across the country are seeing the need to proactively (and in many cases aggressively) pursue renewables to meet customer demand. For example, Xcel Energy (a multi-state electric and natural gas utility operating in eight states) released a plan to reduce its CO<sub>2</sub> emissions 80% below 2005 levels by 2030, and to serve all customers with 100% carbon-free electricity by 2050.<sup>7</sup> Similarly, Consumers Energy in Michigan is pursuing a plan that by 2040 will eliminate coal generation, reduce carbon emissions by 90% from 2005 levels and serve customers with 90% clean energy resources.<sup>8</sup> Xcel and Consumers Energy are not driven by

<sup>6</sup> Plan at 131.

<sup>7</sup> Xcel Energy, “Building A Carbon-Free Future, Carbon Report 2019,” at 4 available at <https://www.xcelenergy.com/staticfiles/xcel/PDF/Xcel%20Energy%20Carbon%20Report%20-%20Mar%202019.pdf> (“Xcel Carbon Report”).

<sup>8</sup> Consumers Energy, “2019 Clean Energy Plan,” at 2 (2019) available at: <https://www.consumersenergy.com/-/media/CE/Documents/sustainability/integrated-resource-plan->

expected environmental regulations, but rather stakeholder expectations.<sup>9</sup> This is the competitive marketplace for new customers, and I&M should send a stronger signal of its intent to provide renewable generation options to its customers.

Large retail customers are making strong commitments to purchase renewable energy. A growing number of companies are setting renewable energy and energy-related sustainability targets. 63% of the Fortune 100 companies have set one or more renewable energy targets, with 48% of the Fortune 500 making similar commitments.<sup>10</sup> Additionally, 162 companies have signed the RE100 commitment to procure 100% renewable electricity to power their operations, including tech companies like Apple, Facebook, Google and Microsoft as well as current Indiana employers General Motors, Nestlé, Walmart, Iron Mountain, Johnson & Johnson, Target, Walmart and others.<sup>11</sup> When utilities show leadership and advance renewable energy, they are able to attract and retain employers and businesses (like the RE100 members) that want more renewable energy. I&M can send a stronger signal, and provide enhanced reasons for sustainability-minded companies to locate in its service territory by making a stronger commitment to renewable generation.

Sending a signal to the sustainability-minded marketplace is critical in Indiana. The Indiana Legislature passed and Governor Holcomb signed into law House Bill 1405 providing tax incentives for the establishment of data centers in Indiana.<sup>12</sup> This new law provides exemptions from the state sales tax for items such as electricity, equipment and construction costs for up to 50

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[summary.ashx?la=en&hash=9F602E19FE385367FA25C66B6779532142CBD374](#)) (“Consumers Clean Energy Plan”)

<sup>9</sup> Xcel Carbon Report at 4; Consumers Clean Energy Plan at 3.

<sup>10</sup> Ceres, “REPORT: Fortune 500 Companies Accelerating Renewable Energy, Energy Efficiency Efforts.” (April 2017) available at: <https://www.ceres.org/news-center/press-releases/report-fortune-500-companies-accelerating-renewable-energy-energy>.

<sup>11</sup> RE100, “Companies” (2019) available at: <http://there100.org/companies>.

<sup>12</sup> See, IC 6-2.5-15, Gross Retail and Use Tax Exemption for Data Center Equipment

years, depending on the size of the investment.<sup>13</sup> Data centers that can claim this exemption are going to be large since the investment required is significant.<sup>14</sup> Large data center entities like Amazon, Microsoft and Facebook all have public commitments to powering its operations with renewable energy.<sup>15</sup>

As a specific example of how important renewables are to data center developers, in announcing plans to build a 400,000 square foot, \$1.3 billion data center in Iowa, Apple CEO Tim Cook said Iowa's renewable energy resource was "paramount for us" and "if we couldn't [procure renewables], we would not be here." The Apple data center will be located in the service territory of MidAmerican Energy Company, which is driving towards a goal to serve customers with 100% renewable energy by 2021.<sup>16</sup> This is an example of how important it is for utilities to make significant commitments to renewable energy in order to attract significant new customers like data centers. While I&M is moving in the right direction, moving further and faster will attract attention and increased opportunity for new customers.

CGA recognizes that there is some risk with a 'if you build it, they will come' approach. However, this concern is mitigated by the fact that the trends are clear: renewable generation is cost-competitive with other resources, Indiana policy is encouraging forward-looking companies like data centers to locate in Indiana, and customer demand for renewables is driving the marketplace. There is much greater peril in the fact that if you do not build renewable generation, companies with sustainability goals will not come and Indiana will miss economic development

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<sup>13</sup> IC 6-2.5-15-14.

<sup>14</sup> *See, id.* (indicating that the investment required is \$750 million).

<sup>15</sup> Brad Smith of Microsoft, "We're Increasing Our Carbon Fees As We Double Down On Sustainability," (April 15, 2019) available at: <https://blogs.microsoft.com/on-the-issues/2019/04/15/were-increasing-our-carbon-fee-as-we-double-down-on-sustainability/>; Amazon, "The Climate Pledge" (September 19, 2019) available at: <https://blog.aboutamazon.com/sustainability/the-climate-pledge>.

<sup>16</sup> MidAmerican Energy Company, "MidAmerican 100% Renewable Vision" available at: <https://www.midamericanenergy.com/100-percent-vision>.

opportunities.<sup>17</sup> For these reasons, CGA encourages I&M to increase its commitment to renewable generation in this Plan to capture near-term economic development opportunities.

## **2. THIRD-PARTY DATA CONFIRMS THAT RENEWABLE GENERATION IS A LOW-COST RESOURCE**

I&M recognizes the many benefits of renewables, noting that the Plan will “add resources to meet its PJM capacity obligation, but also provide zero variable cost energy to enhance rate stability, reduce emissions and further diversify its generation portfolio.”<sup>18</sup> These are all long-term benefits of renewables that, when coupled with the decreasing costs of renewable construction, make renewables a smart choice as generation resources.

While CGA believes that the cost assumptions used by I&M are reasonable, they are on the high side of cost assumptions available from third-party sources. Indeed, I&M assumes a generally increasing cost of renewables, which is inconsistent with third-party data. CGA encourages I&M to use additional third-party resources to ensure that its assumptions are consistent with the cost trends identified in the industry. Further, CGA believes that third-party data will provide an even stronger basis for I&M to be more aggressive in its renewable strategy.

To emphasize the importance of using third-party data, I&M used the following levelized cost of energy (“LCOE”) assumptions for renewables in the near-term:

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<sup>17</sup> A well-designed green tariff program will also help attract companies, however taking a proactive approach allows companies to locate where renewables are in development or already available and avoids the lag that is inherent in green tariff programs.

<sup>18</sup> Plan at 4.

<b>Resource</b>	<b>LCOE</b>	<b>Notes</b>
Wind Tranche A	\$31.05/MWh	Assumes availability of Production Tax Credit (“PTC”); project online in 2022
Wind Tranche B	\$38.55/MWh	Assumes availability of PTC; project online in 2022
Solar Tier 1	\$50/MWh	Assumes availability of Investment Tax Credit (“ITC”); online in 2022
Solar Tier 2	\$54/MWh	Assumes availability of ITC; online in 2022

While CGA does not believe these costs are unreasonable, they are slightly high compared to a variety of other data sources, including data from other Indiana Integrated Resource Plans (“IRPs”).

For example NIPSCO performed a review of the National Renewable Energy Laboratory (“NREL”) Annual Technology Baseline (“ATB”) into its modeling as well as an “All Source” request for proposals (“RFP”) to obtain indicative pricing for renewables in the region.<sup>19</sup> Using this process, NIPSCO identified that the LCOE for standalone wind power purchase agreements (“PPAs”) at \$25.54/MWh and \$38.11/MWh, assuming the availability to serve customers by 2023 and account for use of the federal PTC.<sup>20</sup> Given the NIPSCO figures, it is reasonable to assume a LCOE that is lower than I&M’s assumptions. Regardless, even using the higher figures in I&M’s Plan, renewable generation is cost-competitive with other sources of generation, including new combined cycle gas generation with an LCOE between \$56 and \$60/MWh.<sup>21</sup>

To ensure that I&M is using reasonable cost assumptions, I&M should use verified third-party data sources to inform its future cost and performance assumptions for potential resource

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<sup>19</sup> CGA Comments in NIPSCO IRP at 1-2.

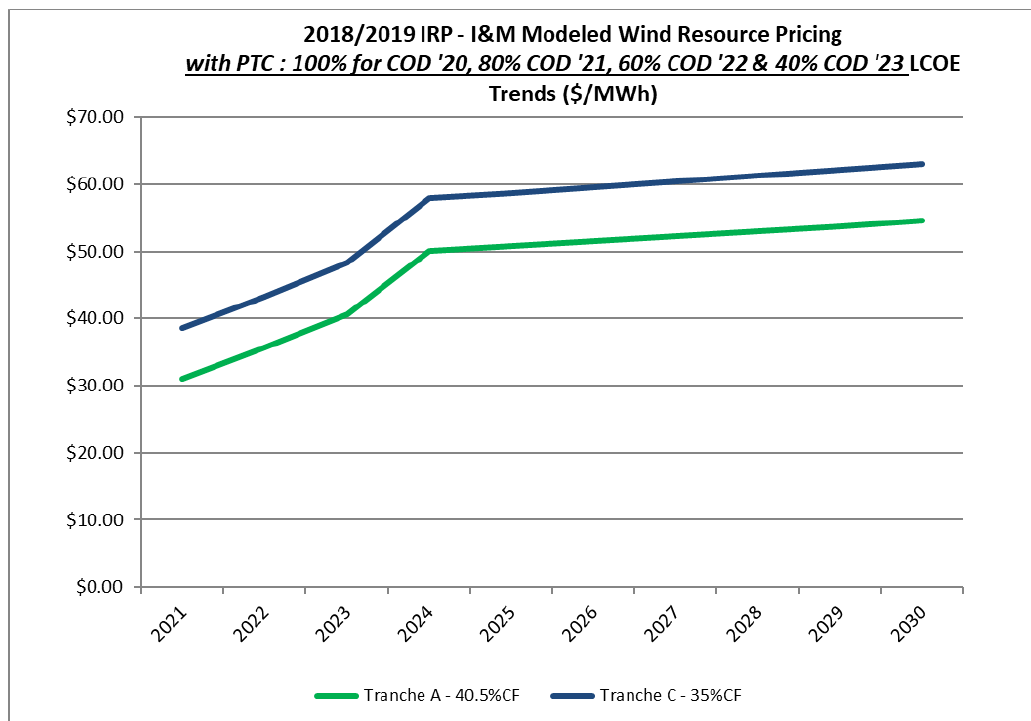
<sup>20</sup> *Id.* at 2.

<sup>21</sup> Plan at 97, Table 15.



additions. The NREL-ATB data used by NIPSCO should be considered a primary screening tool, and RFPs should also be used to verify those costs, resulting in a more reasonable starting point for cost estimates.

Third-party data will not only establish a better baseline for costs, but also a better estimate of costs overtime. For example, I&M assumes that costs for wind generation will steadily increase during the duration of the Plan, as shown in Figure 27<sup>22</sup>:



**Figure 27. Levelized Cost of Electricity of Wind Resources (Nominal \$/MWh)**

While the increase of LCOE in the 2022-2024 timeframe may be attributed to the phase-out of the PTC, the steady increase in I&M’s assumption is inconsistent with other sources. For example, the NREL-ATB estimates that capital costs for onshore wind projects in wind regimes similar to MISO Local Resource Zone 6 will fall from approximately \$1,579/kW to \$1,316/kW by

<sup>22</sup> Plan at 108, Figure 27.

2023, eventually falling to \$834/kW by 2030.<sup>23</sup> This data is consistent with the MISO process, which incorporates ATB data into its planning processes. Importantly, the MISO data confirmed in its Transmission Expansion Plan process, shows that the cost curve for wind will continue a significant downward trend over the next decade.<sup>24</sup>

A similar outcome for solar generation is expected with anticipated advancements in PV technology. The NREL-ATB low estimates for utility-scale solar PV capital costs near Chicago should be used for the early analyses prior to collecting RFPs. The NREL-ATB projects installed capital costs of solar near Chicago to be approximately \$1,105/kW in 2018, decreasing to \$925/kW by 2023, and falling to approximately \$851/kW by 2030.<sup>25</sup> Continued cost reductions combined with capacity factor improvements will apply downward pressure on wind's and utility-scale solar LCOE as federal tax credits phase out. However, the point is clear: wind and solar energy are already cost-competitive without the federal tax credits in many geographic and technological scenarios.

### **Onshore Wind**

Other data sets are reflecting the declining costs of renewable generation as well. While this data set was released after the submission of the Plan, the recently released Lazard Associates' LCOE Analysis Version 13.0 reports a \$28-54/MWh LCOE without subsidies or incentives for U.S. onshore wind projects, making it the lowest cost source of new generation compared to all other resources. Natural gas combined cycle costs are identified as \$44-\$68/MWh.<sup>26</sup> For the

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<sup>23</sup> National Renewable Energy Laboratory, "NREL Annual Technology Baseline," Onshore Wind tab. 2018. <https://atb.nrel.gov/>.

<sup>24</sup> MISO, "MTEP19 Futures Development," (February 14, 2018) available at: <https://cdn.misoenergy.org/20180214%20PAC%20Item%2003a%20MTEP19%20Futures%20Development125886.pdf>.

<sup>25</sup> National Renewable Energy Laboratory, "NREL Annual Technology Baseline," Solar – Utility PV tab. 2018, using an annual inflation rate of 2.5%. Available at: <https://atb.nrel.gov/>.

<sup>26</sup> Lazard, "Lazard's Levelized Cost of Energy Analysis – Version 13.0," at 2 (November 2019) available at:

Technology Resource Groups most likely to be used for onshore wind development in Indiana (TRG5 and TRG6<sup>27</sup>), NREL-ATB reports a \$42-50.43/MWh LCOE without incentives for 2018 (in \$2018).<sup>28</sup> Looking ahead, the NREL-ATB projects that LCOE without incentives for U.S. onshore wind projects will fall from \$42-50.43/MWh in 2018 to \$32.60-\$46.23/MWh by 2023. NREL-ATB's data for 2019 forecasts an even lower price for onshore wind in 2023, with prices in TRG 5 and 6 ranging from \$26.70 to \$42.00/MWh in \$2019. Renewable suppliers agree prices will continue to decline. NextEra Energy Resources Chief Executive Officer Jim Robo recently said that, due to continued turbine price reductions, “without incentives, early in the next decade wind is going to be a [\$20-\$25 per MWh] product.”<sup>29</sup>

### **Solar**

For utility-scale solar resources, Lazard reports a \$32-\$44/MWh LCOE without subsidies or incentives.<sup>30</sup> The NREL-ATB low forecast reports a slightly higher LCOE without incentives for the Chicago area in 2018, at approximately \$37.80/MWh in \$2018.<sup>31</sup> Looking ahead, however, the NREL-ATB low data projects that the LCOE without incentives for utility-scale solar projects near Chicago will fall from that \$37.80/MWh in 2018 to approximately \$22.10/MWh by 2030 in \$2018.<sup>32</sup>

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<https://www.lazard.com/media/451086/lazards-levelized-cost-of-energy-version-130-vf.pdf> .

<sup>27</sup> Wesley Cole et al., National Renewable Energy Lab, “Regional Energy Deployment System (ReEDS) Model Documentation: Version 2016” at 10 (November 2016); available at: <https://www.nrel.gov/docs/fy17osti/67067.pdf>.

<sup>28</sup> National Renewable Energy Laboratory, “NREL Annual Technology Baseline.” 2018. <https://atb.nrel.gov/>.

<sup>29</sup> Recharge News, “NextEra expects US tax overhaul to translate into cheaper turbines,” (January 29, 2018) available at: <https://www.rechargenews.com/wind/1422041/nextera-expects-us-tax-overhaul-to-translate-into-cheaper-turbines>.

<sup>30</sup> Lazard, “Lazard’s Levelized Cost of Energy Analysis – Version 13.0,” at 2 (November 2019) available at: <https://www.lazard.com/media/451086/lazards-levelized-cost-of-energy-version-130-vf.pdf> .

<sup>31</sup> National Renewable Energy Laboratory, “NREL Annual Technology Baseline.” 2018, after adjusting for inflation using an annual inflation rate of 2.5%. Available at: <https://atb.nrel.gov/>.

<sup>32</sup> *Id.*

## **Continued Performance Improvements In Wind And Solar**

Technological advances will continue to drive cost reductions and performance improvements for wind and solar projects. The use of taller turbine towers and longer turbine blades significantly increases the energy capture, improving project performance and reducing final costs. The LBNL Annual Wind Technologies Market Report documents how the average onshore wind turbine rotor diameter has increased from approximately 80 meters in 2008 to 113 meters today.<sup>33</sup> Since the area swept by the turbine blades, and therefore the energy captured, is proportional to  $\pi*r^2$ , this corresponds to a nearly 100% increase in swept area and energy capture.

The wind industry has also transitioned towards taller towers. Approximately 37% of all wind turbines installed in 2017 had hub heights of at least 90 meters, a significant shift away from the 80-meter hub height used in recent years.<sup>34</sup> These technologies allow turbines to access higher, steadier wind speeds, unlocking a greater range of viable wind project sites. Indiana has seen this technological change where the Meadow Lake VI wind project, brought online at the end of 2018 in White County, Indiana, is utilizing 136-meter rotor diameters and 105-meter hub heights.<sup>35</sup>

The use of third-party data will help I&M to confirm its assumptions for future planning. Looking at third-party sources today shows that renewables are cost-competitive with other sources and renewable prices will continue to decline over time, providing an even stronger basis for I&M to pursue additional renewable generation in the near-term.

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<sup>33</sup> Lawrence Berkeley National Laboratory, “2018 Wind Technologies Market Report,” at 24-26 (Aug. 2019) available at: <https://www.energy.gov/sites/prod/files/2019/08/f65/2018%20Wind%20Technologies%20Market%20Report%20FINAL>.

<sup>34</sup> Lawrence Berkeley National Laboratory, “2018 Wind Technologies Market Report,” at 33-34 (Aug. 2019) available at: <https://www.energy.gov/sites/prod/files/2019/08/f65/2018%20Wind%20Technologies%20Market%20Report%20FINAL>.

<sup>35</sup> EDP Renewables North America, “Meadow Lake Wind Farm” Webpage; see Vestas V136 3.6MW turbines, available at: <http://meadowlakewindfarm.com/>.

### **3. I&M SHOULD ISSUE AN ALL-SOURCE RFP ON AT LEAST AN ANNUAL BASIS**

It does not appear that I&M performed an “All-Source RFP” solicitation as part of its IRP process. A well-designed All-Source RFP will help to minimize future cost uncertainty and to identify cost-effective projects to serve near-term capacity needs.<sup>36</sup> A good example of this is NIPSCO’s RFP, which received bids for 59 individual projects spread across 5 states representing over 13 GW of installed capacity, with multiple bids including variations on pricing structure and term length. NIPSCO found the RFP results were “relatively consistent with the third-party data review, but renewable offers were at the low end of the estimates observed in the public literature,” indicating that “technology change and developer activity in a competitive process are dynamic forces that influence the costs of resource options for NIPSCO in the future.”<sup>37</sup> Given how informative this process was for NIPSCO, CGA recommends that all Indiana utilities (including I&M) perform a similar All Source RFP on an annual basis.

An All Source RFP will help to ensure that I&M is making cost-effective decisions. There are 20,450 MW of utility-scale renewable resources, battery storage, and hybrid (generation + storage) resources in the PJM and MISO queues looking to develop in Indiana.<sup>38</sup> Wind, solar, and storage costs are falling rapidly. Wind’s costs have fallen by 69% since 2009 alone and technology advancements are opening up new viable project sites every day.<sup>39</sup> The RFP results would provide up-to-date information on the cost and performance characteristics of all resources, including renewable, available in the market and allow I&M to evaluate multiple configurations for renewable resources with different performance levels and pricing assumptions.

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<sup>36</sup> NIPSCO, “2018 Integrated Resource Plan.” at 54.

<sup>37</sup> *Id.* at 56.

<sup>38</sup> PJM and MISO queue information were reviewed on November 6, 2019.

<sup>39</sup> Lazard, “Lazard’s Levelized Cost of Energy Analysis – Version 12.0.” at 8 (November 2018) (available at: <https://www.lazard.com/media/450784/lazards-levelized-cost-of-energy-version-120-vfinal.pdf>.)

An annual RFP would provide I&M with project-specific pricing and performance characteristics, supplementing other sources for cost information. If the RFP responses indicate that renewable resources are uneconomic, then I&M should not procure those resources, and there is no harm to ratepayers. However, if the results reveal economic resources, pursuing those options will provide net benefits to ratepayers. An RFP ensures fair and low rates for customers by putting all resources, both utility-owned and third-party, on the same competitive playing field.

#### **4. I&M PLANS TO PROCURE A BALANCED MIX OF RENEWABLE RESOURCES**

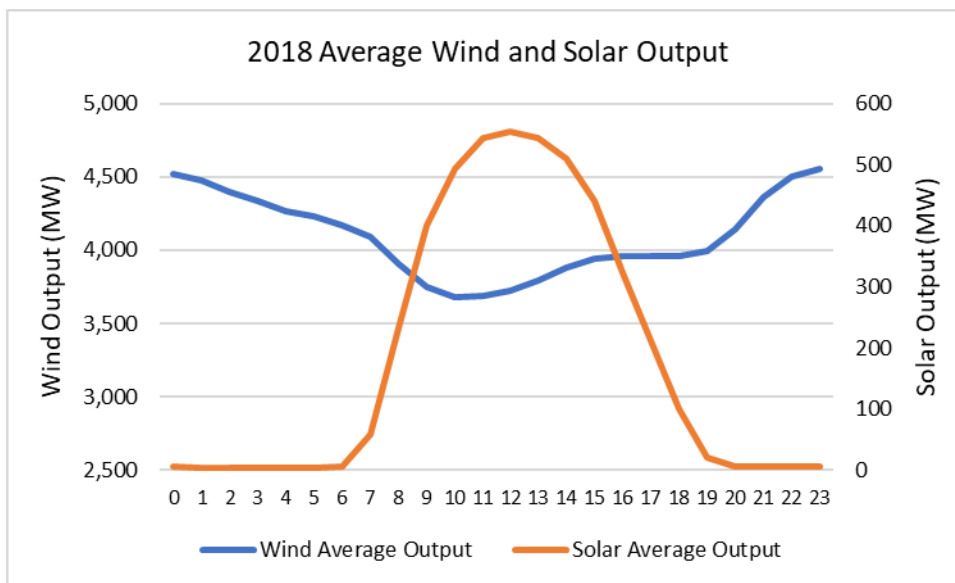
As identified above, I&M's Preferred Plan would ideally add 1,700 MW of solar and 1,950 MW of wind generation to I&M's portfolio. This represents a balanced mix of renewable resources. A balanced mix of wind and solar provide additional value to customers because of their complementary production profiles, with seasonal and diurnal output patterns balancing particularly well. For the reasons stated below, I&M should continue to pursue a balanced mix of these resources in the future.

From a seasonal perspective, wind energy generation tends to be strongest in the winter, spring, and fall months; solar generation is strongest during the summer. On a diurnal basis, wind generation tends to be strongest at night; solar generation ramps up to its highest levels in the middle of the day. The chart below illustrates average daily wind output in MISO and PJM in 2018 as well as average daily solar output in PJM in 2018.<sup>40</sup> Over the course of 24 hours, wind generation complements solar generation, particularly in the late-night hours when solar generation ramps down. These output changes can be forecasted and planned well in advance as

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<sup>40</sup> PJM, Markets and Operations (accessed February 2019). [https://dataminer2.pjm.com/feed/gen\\_by\\_fuel](https://dataminer2.pjm.com/feed/gen_by_fuel). Data derived from all 24-hour periods in 2018; *see also*, MISO, "Historical Hourly Wind Data." Accessed February 2019. <https://www.misoenergy.org/markets-and-operations/market-reports/#nt=%2FMarketReportType%3ASummary%2FMarketReportName%3AHistorical%20Hourly%20Wind%2>.

grid operators have the technology and experience necessary to forecast and prepare for hour-to-hour variability. In fact, today’s weather forecasting technology makes changes in wind and solar energy output rather predictable.



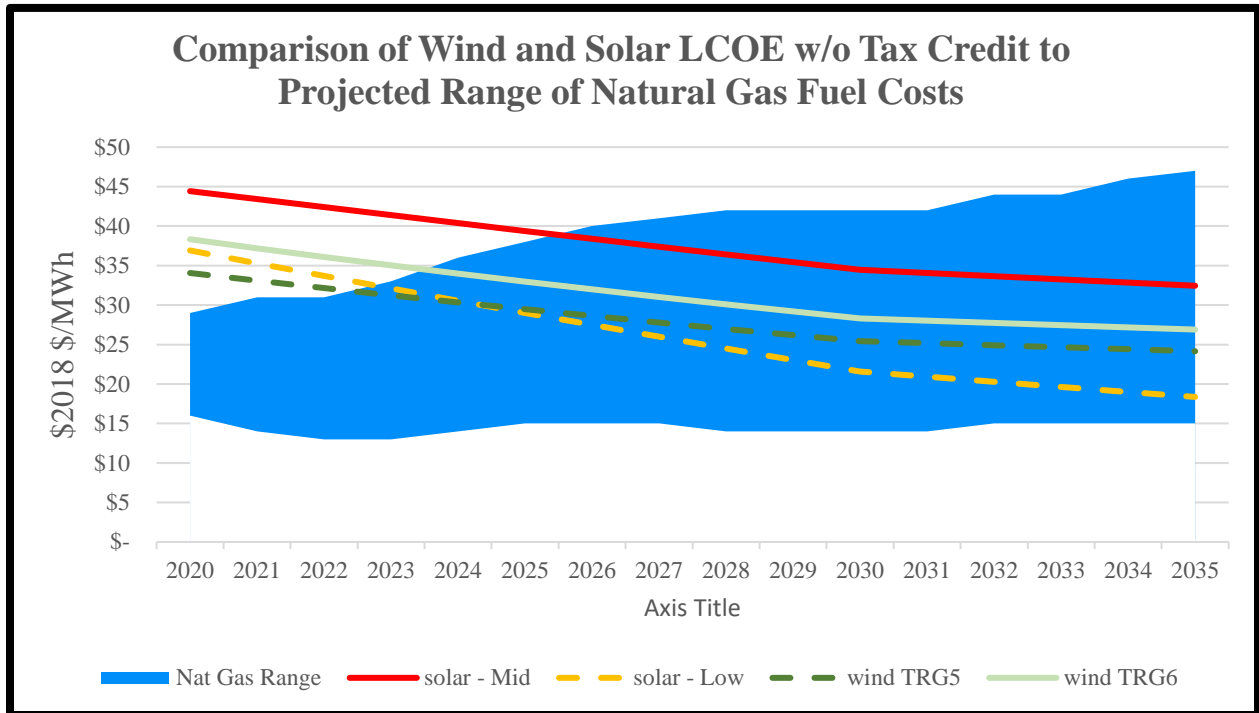
Weather patterns also tend to produce complementary wind and solar energy production profiles. Solar output is typically highest when a high-pressure system is present. High-pressure systems are marked by cloudless days and more intense periods of sunshine. Wind output is typically lower during these systems but improves in low-pressure systems with increased wind speeds and cloud cover.

In the long-term, renewable energy continues to provide portfolio diversity and to hedge against fuel price volatility. Utility-scale wind and solar prices have been competitive with new natural gas for several years. Even without the PTC, they can provide a hedge to fuel costs<sup>41</sup> for natural gas plants. Comparing NREL-ATB forecasted mid-level wind and solar LCOEs for TRGs in Indiana out to 2035 to EIAs latest projections for the fuel cost of natural gas-fired generation,

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<sup>41</sup> The range of natural gas fuel cost projections come from LBNL’s “Wind Technologies Market Report – 2018” at 62-63 (August 2019). That report used fuel projections from EIA’s Annual Energy Outlook 2019.

shows the hedge value they provide to rising or uncertain natural gas plant operations.



CGA commends I&M’s efforts to develop a balance of renewable generation to provide additional value to customers. As I&M makes additional commitments to renewable generation, it should maintain this balance.

**5. I&M SHOULD OFFER A WELL-DESIGNED GREEN TARIFF PROGRAM**

As identified in Section 1, customers in Indiana and across the country have made their commitment to renewable energy very clear, with a growing number of companies setting renewable energy and energy-related sustainability targets. I&M’s overall portfolio should reflect this increasing customer preference for renewable energy.

I&M should also expand options to allow large customers to purchase renewable energy through a green tariff program. Since 2013, U.S. companies have purchased over 15 GW of



renewable energy from offsite projects, procuring wind energy more than any other resource.<sup>42</sup> Most renewable energy purchases from offsite projects are facilitated through virtual PPAs or utility-offered green tariff programs, reflecting a growing preference for direct renewable energy purchases over taking the minimum action to purchase renewable energy credits (“REC”). Six corporate customers procured 478 MW of Indiana wind power capacity through the end of 2018 through PPAs alone. The following table summarizes those purchases:

<b>Contracted Capacity (MW)</b>	<b>Power Purchaser</b>	<b>Project Name</b>	<b>Project Developer</b>	<b>Year Announced</b>
<b>149.50</b>	Amazon Web Services	Amazon Wind Farm (Fowler Ridge)	Pattern Energy Group, Inc.	2015
<b>75.00</b>	Cummins	Meadow Lake VI	EDP Renewables North America	2017
<b>139.00</b>	Facebook	Headwaters II	EDP Renewables North America	2018
<b>5.00</b>	Iron Mountain	Meadow Lake III	EDP Renewables North America	2018
<b>49.95</b>	Nestlé	Meadow Lake VI	EDP Renewables North America	2018
<b>60.00</b>	Walmart	Headwaters II	EDP Renewables North America	2018

As of October 2018, there were no Indiana utilities offering green tariff programs.<sup>43</sup> While I&M offers the IM Green and IM Solar options for customers to purchase from I&M owned resources<sup>44</sup>, I&M could enhance options for customers by expanding options for customers to buy bundled renewable energy products. A more robust green tariff program would allow customers

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<sup>42</sup> Business Renewables Center, “BRC Deal Tracker.” Accessed February 2019.

<http://businessrenewables.org/corporate-transactions/>.

<sup>43</sup> World Resources Institute, “Emerging Green Tariffs in U.S. Regulated Electricity Markets,” (October 2018) available at: [https://wriorg.s3.amazonaws.com/s3fs-public/emerging-green-tariffs-in-us-regulated-electricity-markets\\_1.pdf?\\_ga=2.134860018.208984116.1549575612-548565371.1531225968](https://wriorg.s3.amazonaws.com/s3fs-public/emerging-green-tariffs-in-us-regulated-electricity-markets_1.pdf?_ga=2.134860018.208984116.1549575612-548565371.1531225968).

<sup>44</sup> See, “My Renewable Choices”, Indiana Michigan Power webpage, accessed November 27, 2019, available at: <https://www.indianamichiganpower.com/account/bills/manage/RenewableChoices/>

to realize the benefits of a bundled product such as being able to enter into a long-term contract that hedges against future fuel price volatility.

The Corporate Renewable Energy Buyers' Principles, signed by multiple Indiana companies, confirm customer interest in working with their local utilities "to design and develop innovative programs and products that meet our needs."<sup>45</sup> These companies also prefer purchasing renewable energy from new projects "within reasonable proximity to their facilities," specifically on their local electricity grid."<sup>46</sup>

Eligible customers have procured a total of 1,906 MW of renewable energy via green tariff programs to date, with an additional 950 MW currently under negotiation.<sup>47</sup> This represents significant recent interest, as 99% of the 1,906 MW were signed since the beginning of 2015 alone. General Motors, in particular, shared in its blueprint "Accelerating and Scaling Corporate Renewable Energy" that they view green tariff programs "as a significant part" of their renewable energy procurement strategy moving forward.<sup>48</sup> I&M should align with these corporate strategies (as well as green tariff programs offered in other states) by offering a green tariff program and procuring additional renewable energy in anticipation of this demand.

I&M should review green tariff designs in other states and survey customers to design a green tariff that considers the following components:

- offers bundled renewable energy products to customers<sup>49</sup>;

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<sup>45</sup> Renewable Energy Buyers Alliance, "Corporate Renewable Energy Buyers' Principles," accessed December 2019, available at: <http://buyersprinciples.org/principles/>.

<sup>46</sup> *Id.*

<sup>47</sup> World Resources Institute, "Grid Transformation: Green Tariff Deals," accessed November 2019, available at: <https://www.wri.org/resources/charts-graphs/grid-transformation-green-tariff-deals>.

<sup>48</sup> General Motors, "Accelerating and Scaling Corporate Renewable Energy," at 4 (2017).

<sup>49</sup> *See e.g.*, Renewable Energy Buyers Alliance, "Corporate Renewable Energy Buyers' Principles," available at: <http://buyersprinciples.org/principles>, discussing the benefits of bundled purchases over unbundled purchases of renewable energy credits.

- uses a transparent competitive market solicitation process<sup>50</sup>;
- ensures that customers are charged a cost-based price (with market-based billing structure if possible)<sup>51</sup>;
- provides options for customers to negotiate directly with third-party suppliers<sup>52</sup>;
- provides flexible term options for customers; and
- allows for aggregation of multiple customers (or multiple accounts) in order to gain the benefits of economies of scale.<sup>53</sup>

I&M should review a variety of options, and provide enhanced opportunities for customers to access renewable generation options.

## **6. I&M’S RESOURCE PLANNING PROCESS USES REASONABLE AND RELIABLE MODELS**

As more renewable resources are added to the MISO and PJM systems, I&M will need to evaluate system needs for all hours of the year – not just peak hours. I&M identifies that its portfolio optimization was completed using a combination of Plexos and AURORA models.<sup>54</sup> This is similar to the process used by Puget Sound Energy in its 2017 IRP processes, which highlighted the benefits of using Plexos to evaluate sub-hourly operational capabilities.<sup>55</sup> Such flexibility is

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<sup>50</sup> See e.g., National Renewable Energy Laboratory, “Procurement Options for New Renewable Electricity Supply,” (December 2011) available at: <http://www.nrel.gov/docs/fy12osti/52983.pdf>.

<sup>51</sup> See e.g., Omaha Public Power District, “Electric Rate Schedules and Service Regulations” at 44 (February 2019), available at: <https://www.oppd.com/media/207840/oppd-rate-manual.pdf> ; Virginia Electric and Power Company, “Schedule RG Renewable Generation Supply Service,” (December 11, 2018), available at: <https://www.dominionenergy.com/library/domcom/media/large-business/renewable-energy- programs/schedule-rg/compliance-filing-schedule-rg.pdf?la=en>.

<sup>52</sup> See e.g., Rocky Mountain Power, “Electric Service Schedule No. 32,” (April 1, 2015), available at: [https://www.rockymountainpower.net/content/dam/pcorp/documents/en/rockymountainpower/rates-regulation/utah/rates/032\\_Service\\_From\\_Renewable\\_Energy\\_Facilities.pdf](https://www.rockymountainpower.net/content/dam/pcorp/documents/en/rockymountainpower/rates-regulation/utah/rates/032_Service_From_Renewable_Energy_Facilities.pdf) .

<sup>53</sup> See e.g., Georgia Power “Commercial & Industrial REDI Schedule: CIR-1.” (Effective January 2019), available at: <https://www.georgiapower.com/content/dam/georgia-power/pdfs/business-pdfs/rates-schedules/ci-redi-tariff.pdf>.

<sup>54</sup> Plan at 76-77.

<sup>55</sup> Puget Sound Energy, “2017 PSE Integrated Resource Plan” at 3-12 (Accessed December 2019), available at: <https://pse-irp.participate.online/>.

exceptionally important for evaluating renewable resources that provide sub-hourly ramping capabilities. Appalachian Power recognized wind and solar's energy contributions in its 2017 IRP, noting that renewables made a "fairly modest" capacity contribution, according to PJM's Capacity Performance rules, but that wind energy, in particular, provided a significant volume of energy and would help to lower customer costs and lower exposure to volatile energy markets.<sup>56</sup>

CGA commends I&M for using models with the capability of evaluating energy services, and the sub-hourly ramping capabilities. For consistency in evaluation, CGA believes that all Indiana utilities should use tools and models that allows for improved hourly or sub-hourly system modelling.

## **7. I&M'S COMMITMENT TO BATTERY STORAGE IS A POSITIVE STEP**

I&M identifies that its transitional plan will incorporate 50 MW of battery storage and 54 MW of mini-grid resources by 2028.<sup>57</sup> Among other benefits, I&M notes that this commitment will help to ensure that the Company gains a better understanding of how these resources may benefit the customers.<sup>58</sup> CGA commends this commitment to new technology, which is likely to help increase the benefits of renewable generation, and decrease the need for fossil generation in the long-term. CGA looks forward to I&M's reports on the benefits of this new technology on its system.

## **8. TRANSMISSION PLANNING**

I&M describes its transmission planning process in the Plan.<sup>59</sup> Similar to what NIPSCO is

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<sup>56</sup> Appalachian Power, Docket No. PUR-2017-0045, "Integrated Resource Planning Report to the Commonwealth of Virginia State Corporation Commission," at ES-12 (May 1, 2017), available at:

<http://www.scc.virginia.gov/docketsearch/DOCS/3%23%25901!.PDF>.

<sup>57</sup> Plan at 4.

<sup>58</sup> Plan at 130.

<sup>59</sup> Plan at 60-70.

proposing, CGA encourages I&M to perform a specific study to consider transmission upgrades that would be needed to efficiently and reliably deliver electricity when considering its generating plant retirements and additions. Such a study should give I&M a transmission expansion proposal to include in PJM's transmission expansion plans with the goal of improving reliability and lowering the overall production cost of electricity.

## 9. CONCLUSION

WHEREFORE, CGA requests that the Commission and I&M consider the information provided and adopt the recommendations contained herein.

Respectfully Submitted,

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DATED: December 2, 2019